

Figure 5.3 (cont.): Piece A2A5 after sectioning, looking down on the front face of previous photo. The mounted surface on sample A2A5C is indicated. This area contained the thinnest measured cladding (0.202").

Table 5.4: Sample identification listing for Piece A2A6.

Piece ID	Location	Test Plan	Met	SEM
A2A6A1	RV head near 90°	No plan	--	--
A2A6A2 (see below)	Lower portion of J-groove weld and clad from 350°-70°	Contains lower portion of axial crack at ~10° and circ cracks (0°-45°)	3	2
A2A6B (see below)	Upper portion of J-groove weld from 350°-70°	Contains upper portion of axial crack at ~10°	1	2

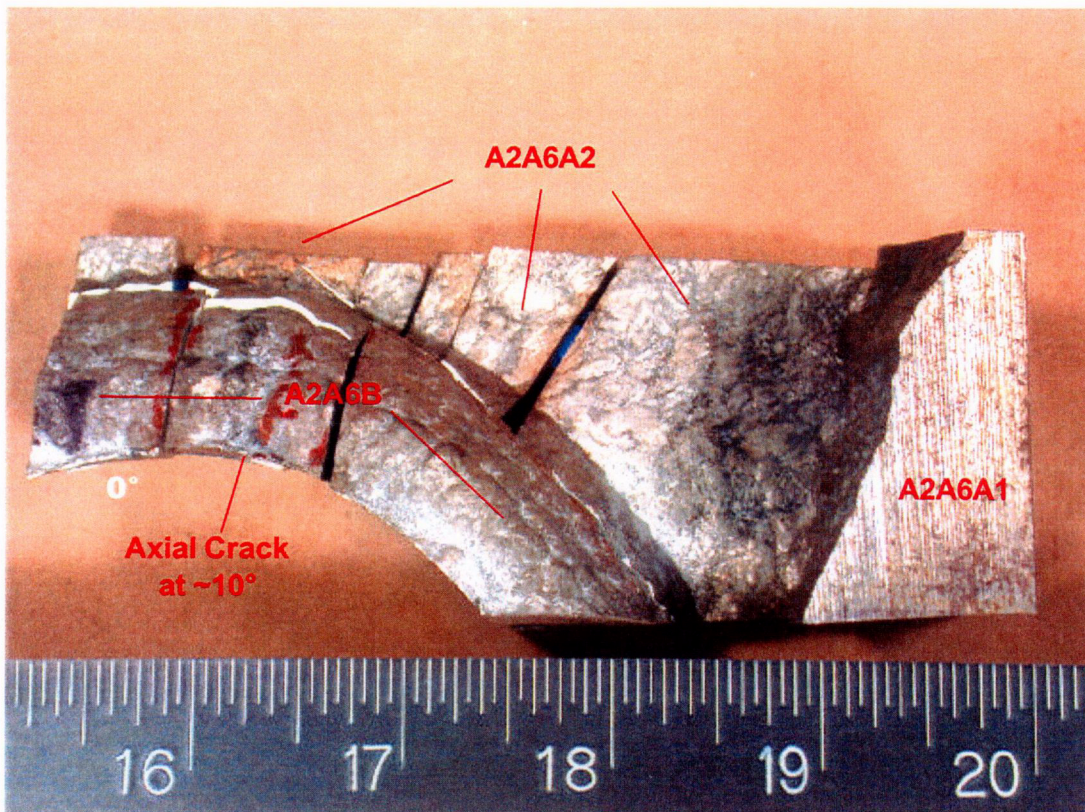


Figure 5.4: Piece A2A6 was first sectioned into Pieces A2A6A and A2A6B. Piece A2A6A was further sectioned into Pieces A2A6A1 and A2A6A2. Both cuts were made on the same plane, parallel to the paper. The first cut line is partially visible; Piece A2A6B is the upper portion of the weld. The second cut line between Pieces A2A6A1 and A2A6A2 is obscured by Piece A2A6A1.

Table 5.5: Sample identification listing for Piece A2A6B.

Piece ID	Location	Test Plan	Met	SEM
A2A6B1	Upper portion of J-groove weld at $\sim 350^\circ$	No plan	--	--
A2A6B2	Upper portion of J-groove weld axial crack at $\sim 10^\circ$	Lower surface mounted for met/SEM	1	1
A2A6B3	Mid portion of J-groove weld axial crack at $\sim 10^\circ$	Open crack SEM sample	--	1
A2A6B4	Upper portion of J-groove weld from 30° - 70°	No plan	--	--

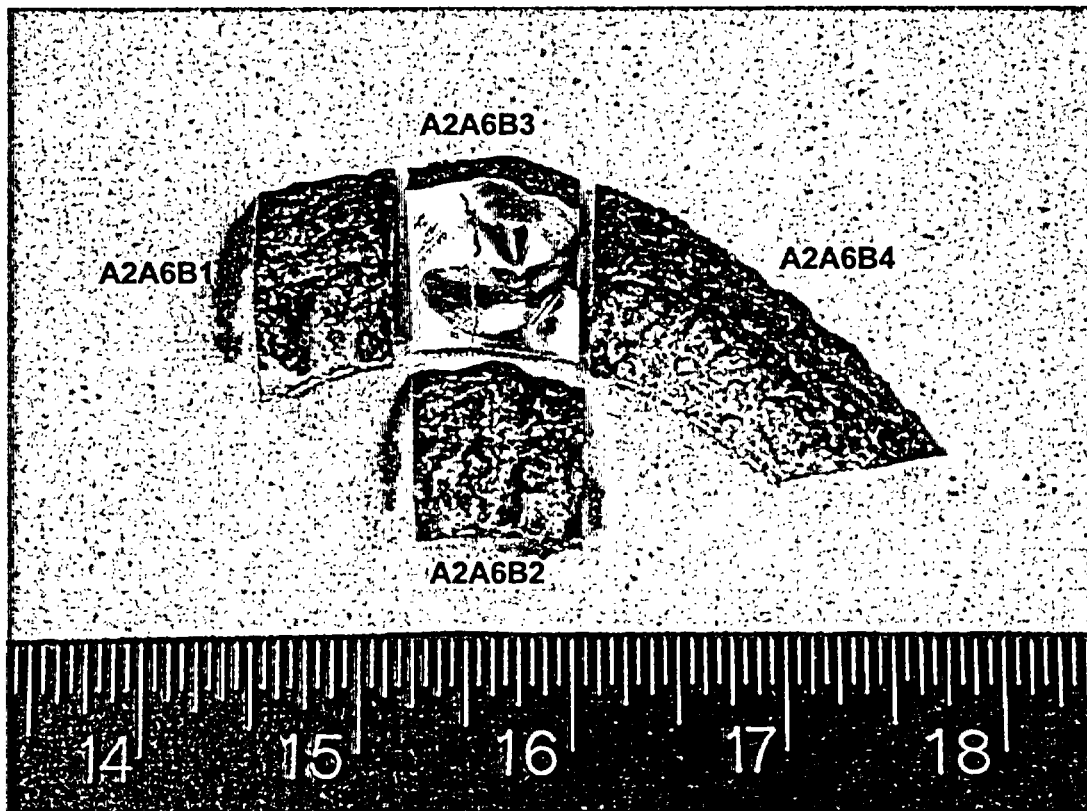


Figure 5.5: Piece A2A6B after sectioning. The bottom surface of A2A6B2 was mounted. The axial crack in A2A6B3 was opened up for SEM.

Table 5.6: Sample identification listing for Piece A2A6A2.

Piece ID	Location	Test Plan	Met	SEM
A2A6A2A	Lower portion of J-groove weld and clad at ~70°	No plan	--	--
A2A6A2B	Lower portion of J-groove weld and clad at ~45°	Contains circ crack near 45°	1	--
A2A6A2C	Lower portion of J-groove weld and clad at ~30°	Open circ crack sample for SEM	--	1
A2A6A2D	Lower portion of J-groove weld and clad at ~20°	Contains circ crack near 20°	1	1
A2A6A2E	Lower portion of J-groove weld and clad at ~10°	Contains axial crack and circ cracks at 10°	1	--
A2A6AF	Lower portion of J-groove weld and clad at ~0°	No plan	--	--

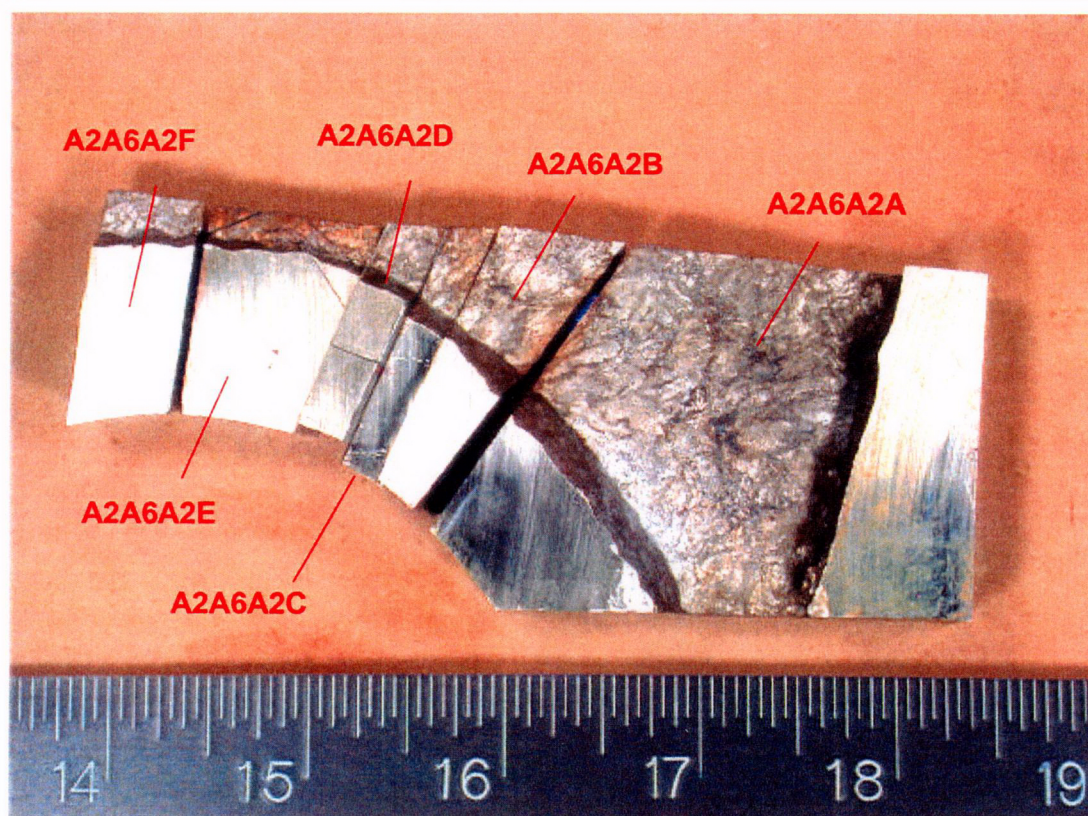


Figure 5.6: Piece A2A6A2 after sectioning. Additional sections were made on A2A6A2B, -C, -D, and -E. Refer to the following four tables and figures.

Table 5.7: Sample identification listing for Piece A2A6A2B.

Piece ID	Location	Test Plan	Met	SEM
A2A6A2B1	Lower portion of J-groove weld at ~45° (includes bore)	No plan	--	--
A2A6A2B2	Lower portion of J-groove weld and clad at ~45°	Contains circ crack near 45°	1	--
A2A6A2B3	Clad at ~45°	No plan	--	--

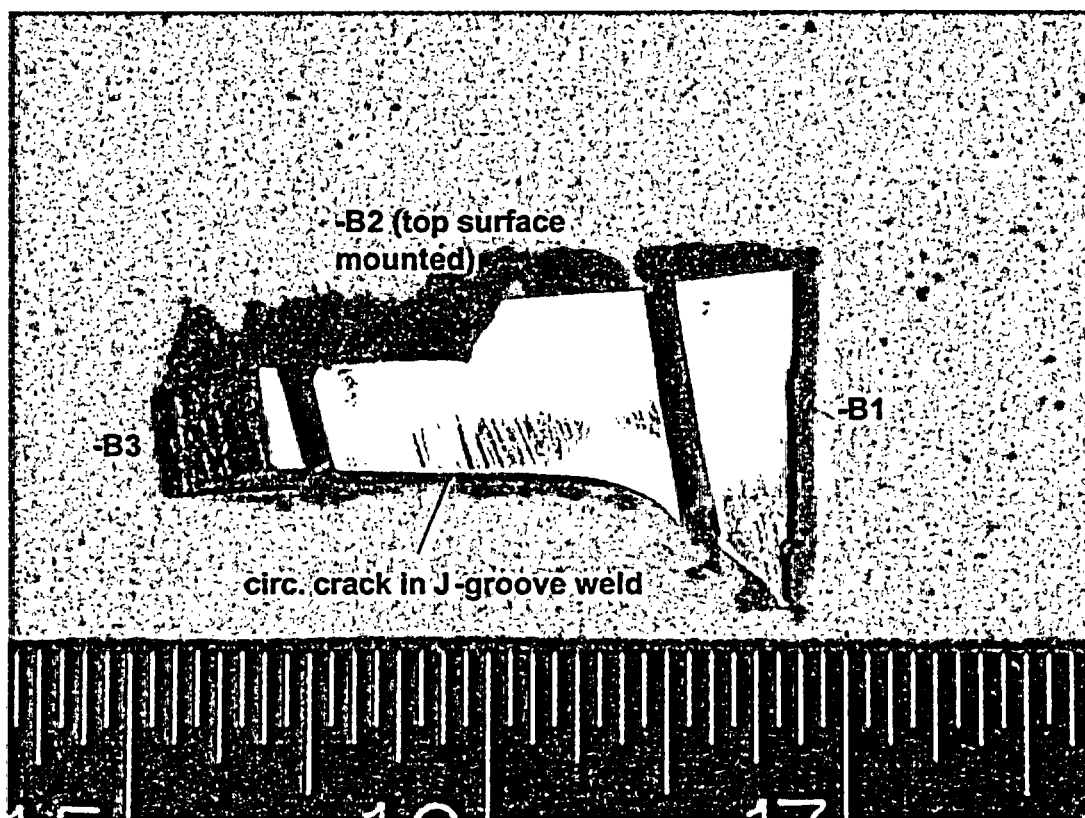


Figure 5.7: Piece A2A6A2B after sectioning (side view of Figure 5.6). The top surface of A2A6A2B2 was mounted.

Table 5.8: Sample identification listing for Piece A2A6A2C.

Piece ID	Location	Test Plan	Met	SEM
A2A6A2C1	Lower portion of J-groove weld and upper surface of clad at $\sim 30^\circ$ (includes bore)	No plan	--	--
A2A6A2C2	Lower portion of J-groove weld and clad at $\sim 30^\circ$	Circ crack near 30° bent open for SEM	--	1
A2A6A2C3	Lower portion of J-groove weld (RCS side)	No plan	--	--

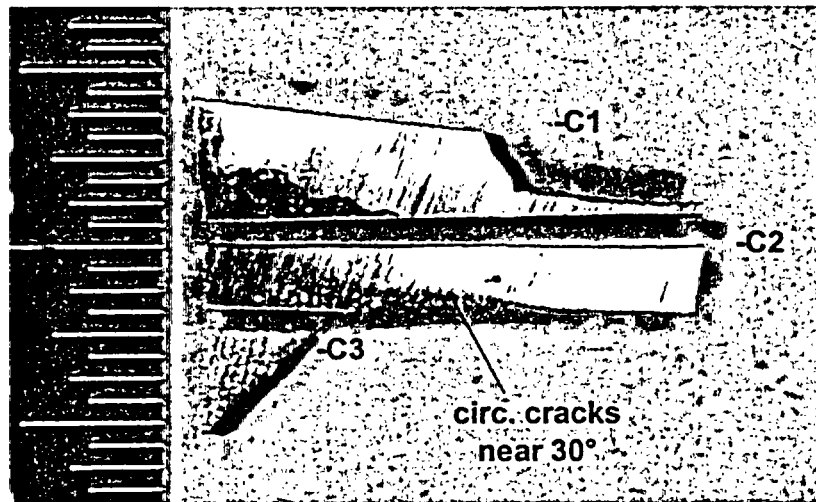


Figure 5.8: Piece A2A6A2C after sectioning (side view of Figure 5.6). The circumferential cracks were bent open for SEM.

Table 5.9: Sample identification listing for Piece A2A6A2D.

Piece ID	Location	Test Plan	Met	SEM
A2A6A2D1	Lower portion of J-groove weld at ~20° (includes bore)	No plan	--	--
A2A6A2D2	Lower portion of J-groove weld and clad at ~20°	Contains circ crack at ~20°	1	1

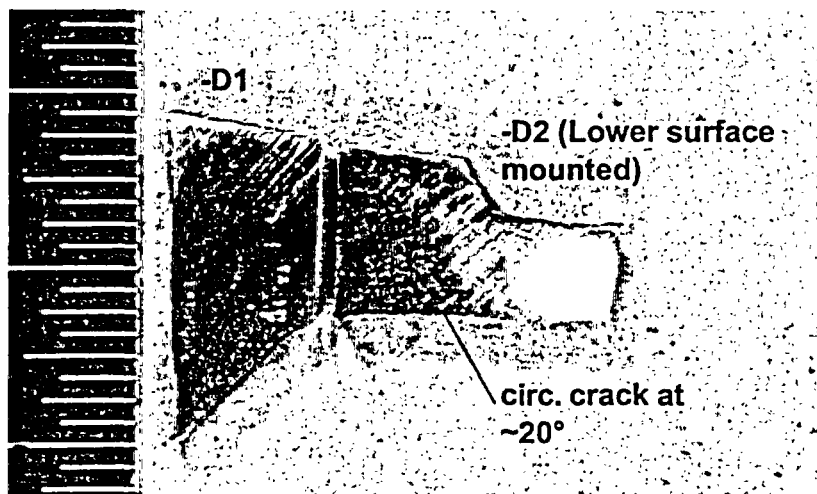


Figure 5.9: Section photo for Piece A2A6A2D (side view of Figure 5.6). The mounted surface of Piece A2A6A2D2 for optical and SEM examination is the lower surface (not visible) in the photo.

Table 5.10: Sample identification listing for Piece A2A6A2E.

Piece ID	Location	Test Plan	Met	SEM
A2A6A2E1	Lower portion of J-groove weld at $\sim 10^\circ$	Lower surface mounted for met	1	--
A2A6A2E2	Contains clad at $\sim 20^\circ$	No plan	--	--
A2A6A2E3	Contains clad at $\sim 0^\circ$	No plan	--	--
A2A6A2E4	Lower portion of J-groove weld (RCS side)	Contains axial and circ cracks at $\sim 10^\circ$ (PNL Sample)	--	--

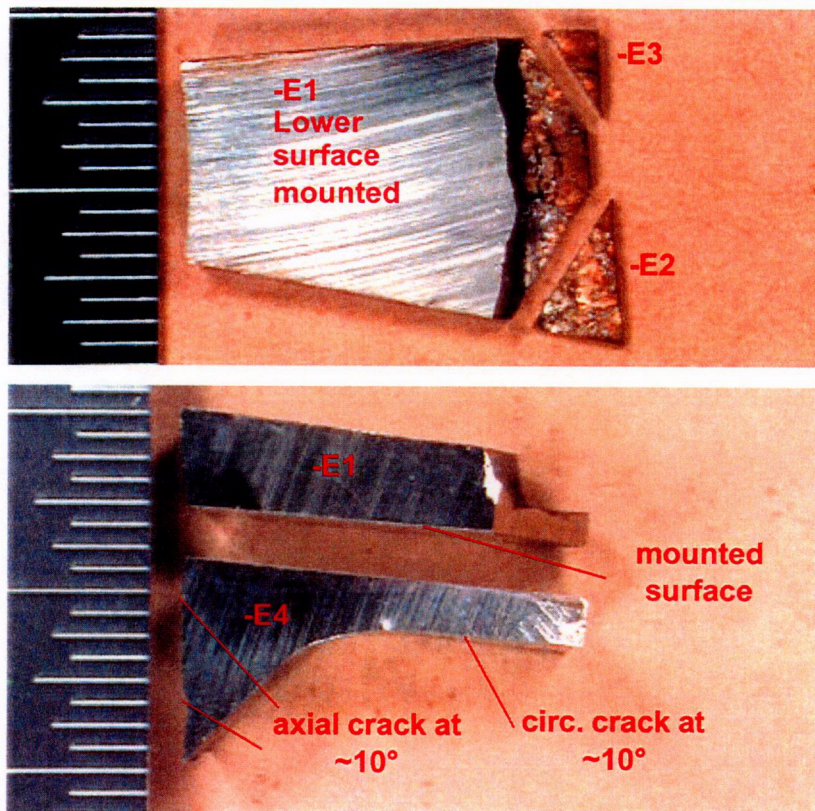


Figure 5.10: Section photo for Piece A2A6A2E (side view of Figure 5.6). The mounted surface of Piece A2A6A2E1 is indicated. Piece A2A6A2E4 is reserved for PNL.

Table 5.11: Sample identification listing for Piece A2A7.

Piece ID	Location	Test Plan	Met	SEM
A2A7A	RV head and clad near 350°	No plan	--	--
A2A7B	RV head and clad near 340°	No plan	--	--
A2A7C	RV head near 345°	No plan	--	--
A2A7D	Undercut region near 345°	Met mount	1	--
A2A7E	RV head and clad near nose	No plan	--	--
A2A7F	Undercut region near nose	Met mount	1	--
A2A7G	RV head near nose	No plan	--	--
A2A7H	Clad prior to nose	No plan	--	--
A2A7I	RV head and clad near 50°	No plan	--	--
A2A7J	RV head and clad near 40°	No plan	--	--
A2A7K	Undercut region near 40°	Met mount	1	--
A2A7L	Center portion of clad cracks	SEM open crack sample	--	1
A2A7M	Adjacent to center cracks	Met mount (center portion)	1	1
A2A7N	Clad cracks toward 270°	Met mount (270°)	1	1
A2A7O	Clad near 0°	No plan	--	--
A2A7P	Center portion of clad cracks	Reserved for PNL	--	--
A2A7Q	Clad near 40°	No plan	--	--
A2A7R	Clad near 40°	No plan	--	--
A2A7S	Clad cracks toward 90°	Met mount	1	1
A2A7T	Clad near 60°	No plan	--	--
A2A7U	Clad near 10°	No plan	--	--

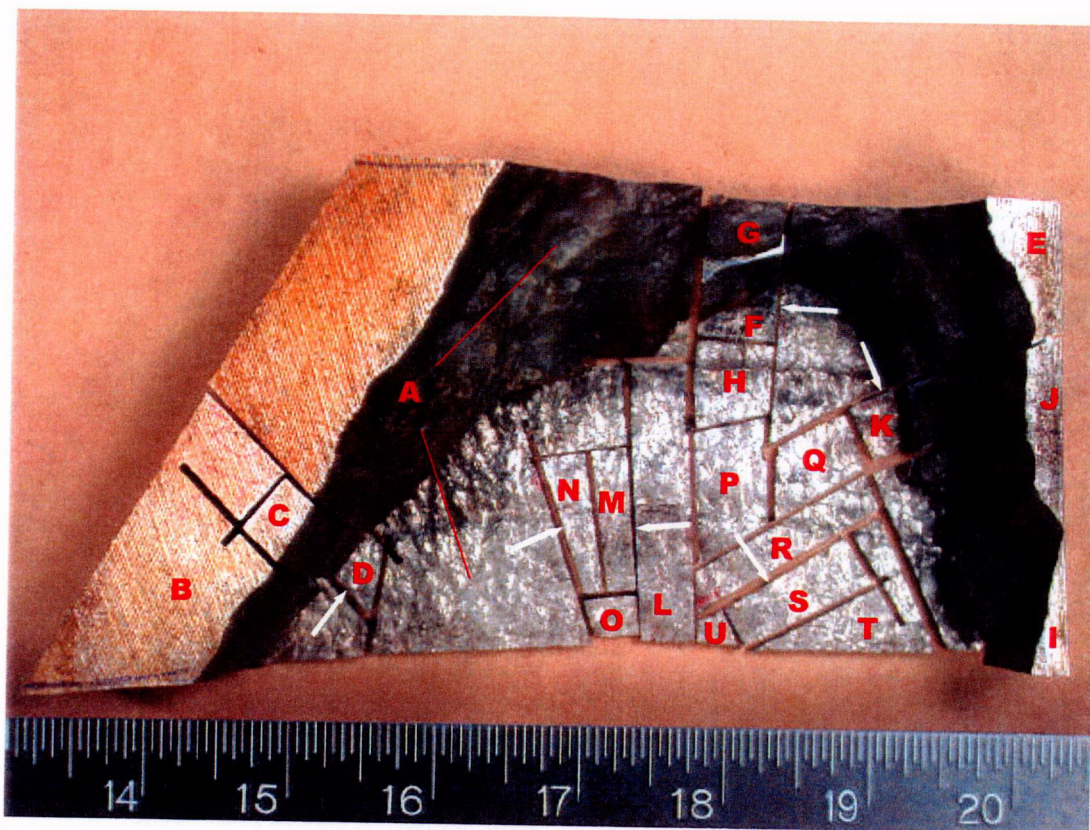


Figure 5.11: Section photo for Piece A2A7. The mounted surfaces for the -D, -F, -K, -M, -N, and -S samples are indicated by the white arrows. Further sectioning of Piece A2A7L is shown in Figure 5.12.

Table 5.12: Sample identification listing for Piece A2A7L.

Piece ID	Location	Test Plan	Met	SEM
A2A7L1A	Center portion of clad cracks	SEM open crack sample	--	1
A2A7L1B	Adjacent to center cracks	No plan	--	--
A2A7L2A	Center portion of clad cracks	SEM open crack sample	--	1
A2A7L2B	Adjacent to center cracks	No plan	--	--

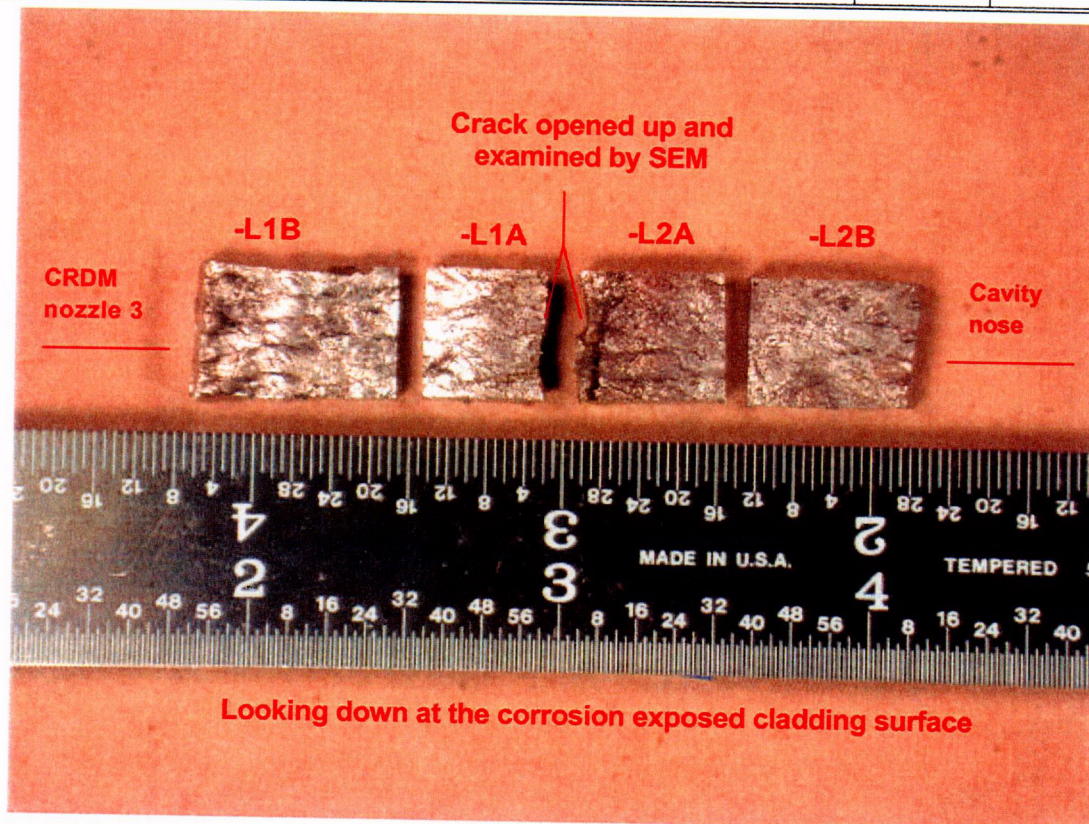


Figure 5.12: Section photo for Piece A2A7L. The main crack located near the center of A2A7L was opened in the laboratory, resulting in Pieces A2A7L1 and A2A7L2. Additional sections, which created the -A and -B pieces, were made to facilitate the SEM examinations. The surfaces examined by SEM are indicated.

Table 5.13: Sample identifications for Piece A1.

Piece ID	Location	Test Plan	Met	SEM
A1A	Contains cavity nose	No plan	--	--
A1B	Contains cavity side wall toward 90°	Met and SEM/EDS samples (see Table 5.14)	2	1
A1C	Contains nozzle #3 bore and small portion of cavity	No plan	--	--
A1D	Contains cavity side wall toward 270°	Met and SEM/EDS samples (see Tables 5.15 and 5.16)	2	1

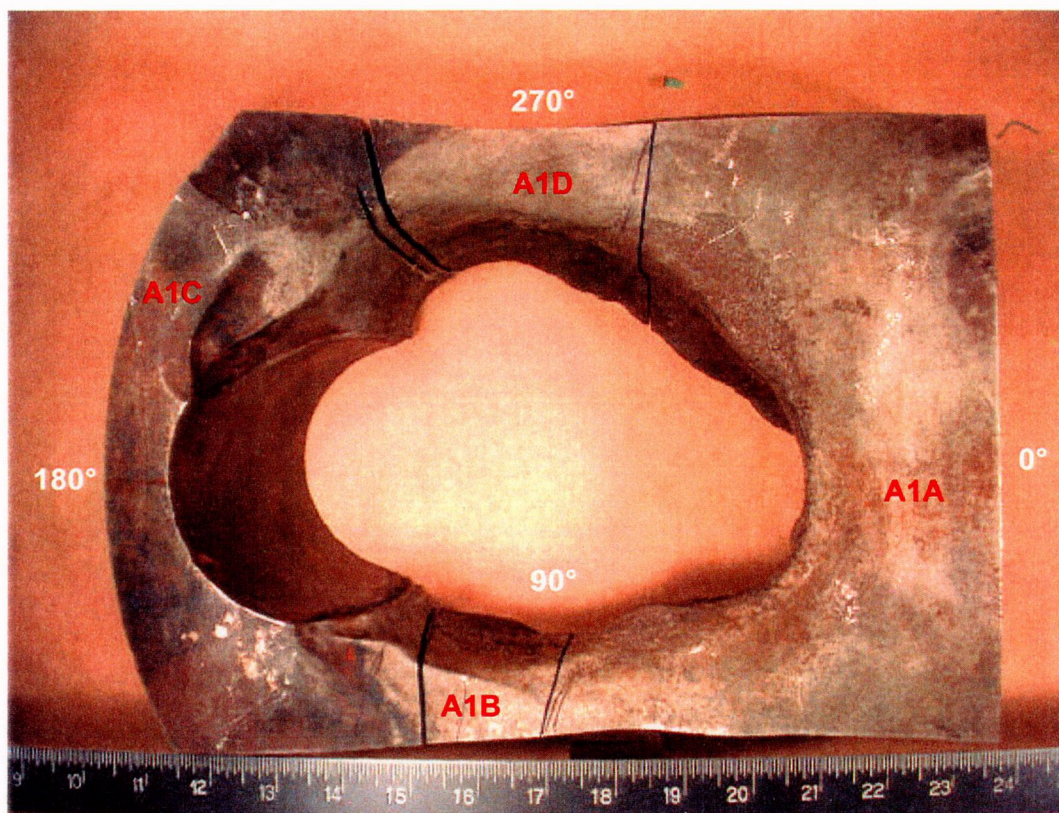


Figure 5.13: Sectioning of Piece A1 into four pieces. Pieces A1B and A1D were further sectioned for metallography and SEM. Refer to Figure 5.14 through Figure 5.16.

Table 5.14: Sample identifications for Piece A1B.

Piece ID	Location	Test Plan	Met	SEM
A1B1	Upper portion of cavity side wall near 90°	No plan	--	--
A1B2	Upper portion of cavity side wall near 90°	Transverse met mount	1	--
A1B3	Middle portion of cavity side wall near 90°	SEM/EDS sample	--	1
A1B4	Lower portion of cavity side wall near 90°	Transverse met mount	1	--
A1B5	RV head behind cavity side wall	No plan	--	--
A1B6	Lower portion of cavity side wall near 90°	No plan	--	--
A1B7	Cavity side wall	No plan	--	--

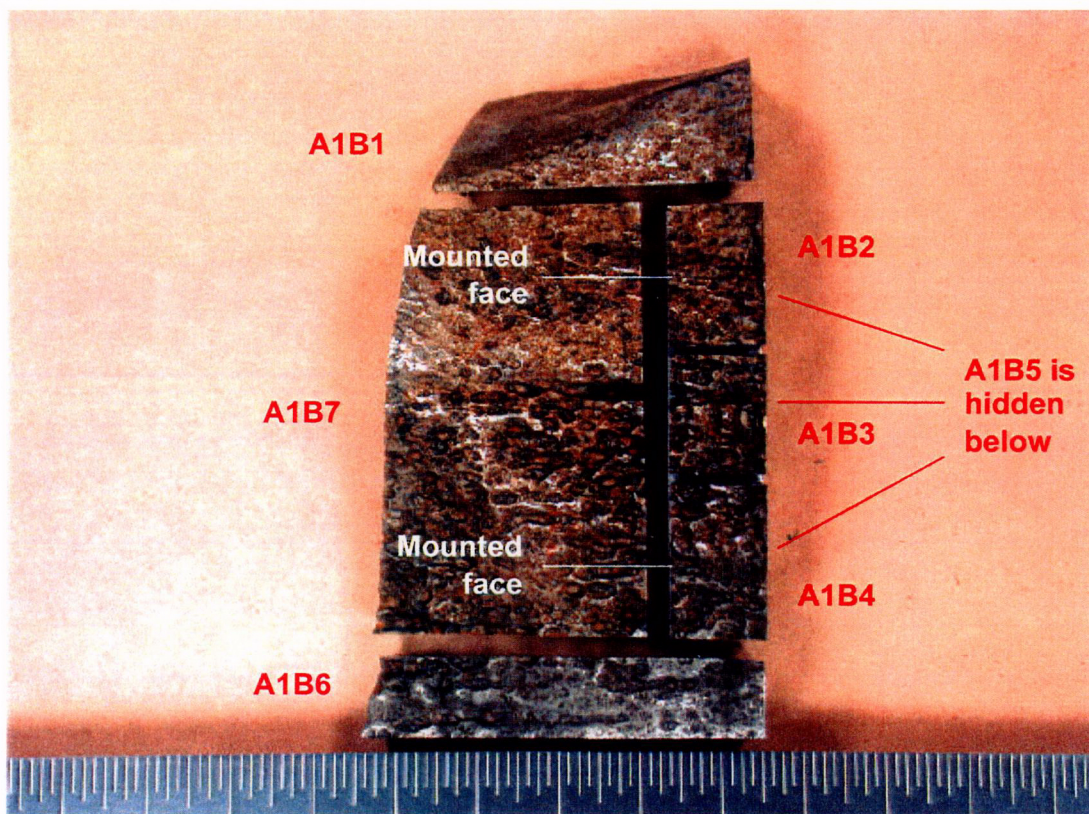


Figure 5.14: Section photo for Piece A1B, looking at the cavity side wall. The mounted surfaces of Piece A1B2 and Piece A1B4 is indicated.

Table 5.15: Sample identifications for Piece A1D.

Piece ID	Location	Test Plan	Met	SEM
A1D1	Cavity side wall near 270°	No plan	--	--
A1D2A	Upper portion of cavity side wall near 270°	No plan	--	--
A1D2B	Upper portion of cavity side wall near 270°	Transverse met mount location	1	--
A1D2C	Middle portion of cavity near 270°	SEM/EDS	--	1
A1D2D	Lower portion of cavity side wall near 270°	Transverse met mount location	1	--
A1D2E	RV head behind cavity side wall	Macroetch sample	--	--
A1D2F	Lower portion of cavity near 270°	No plan	--	--

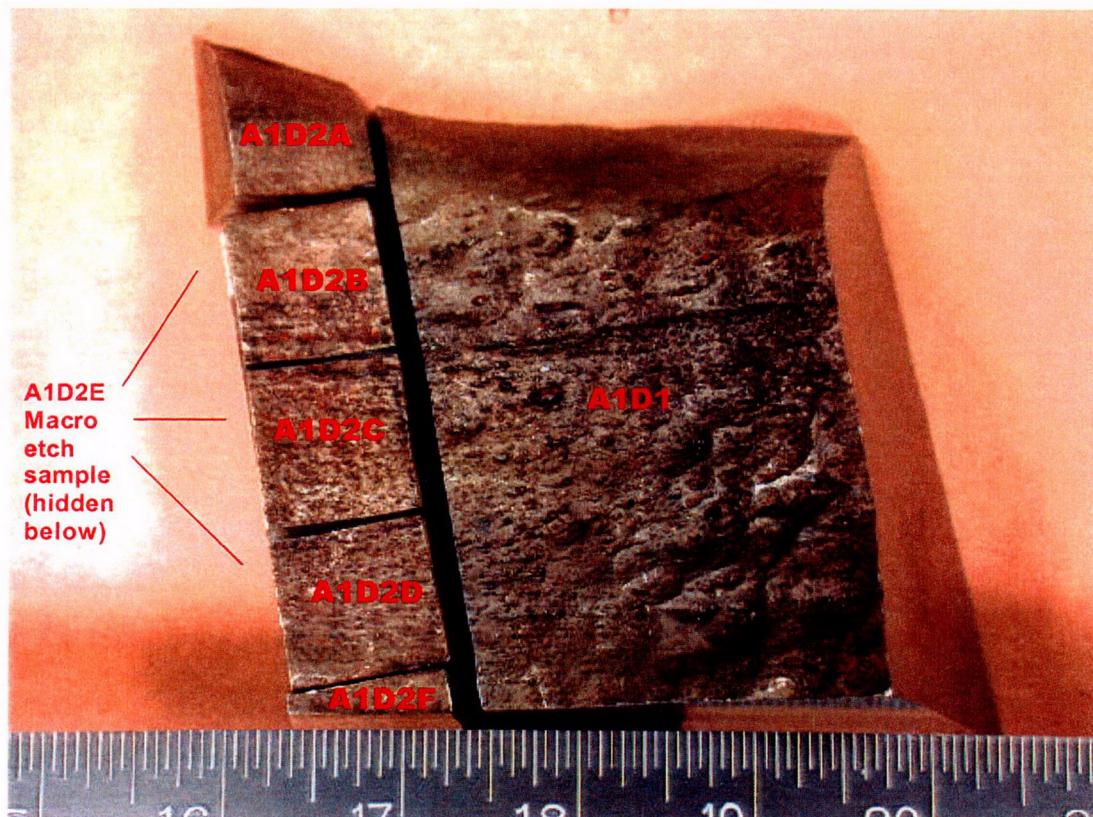


Figure 5.15: Section photo for Piece A1D, looking at the cavity side wall. Refer to Figure 5.16 for the mounted surface locations.

Table 5.16: Sample identifications for Piece A1D2B and Piece A1D2D.

Piece ID	Location	Test Plan	Met	SEM
A1D2B1	Upper portion of cavity side wall near 270°	Transverse met mount location	1	--
A1D2B2	Upper portion of cavity side wall near 270°	No plan	--	--
A1D2D1	Lower portion of cavity side wall near 270°	Transverse met mount location	1	--
A1D2D2	Lower portion of cavity side wall near 270°	No plan	--	--

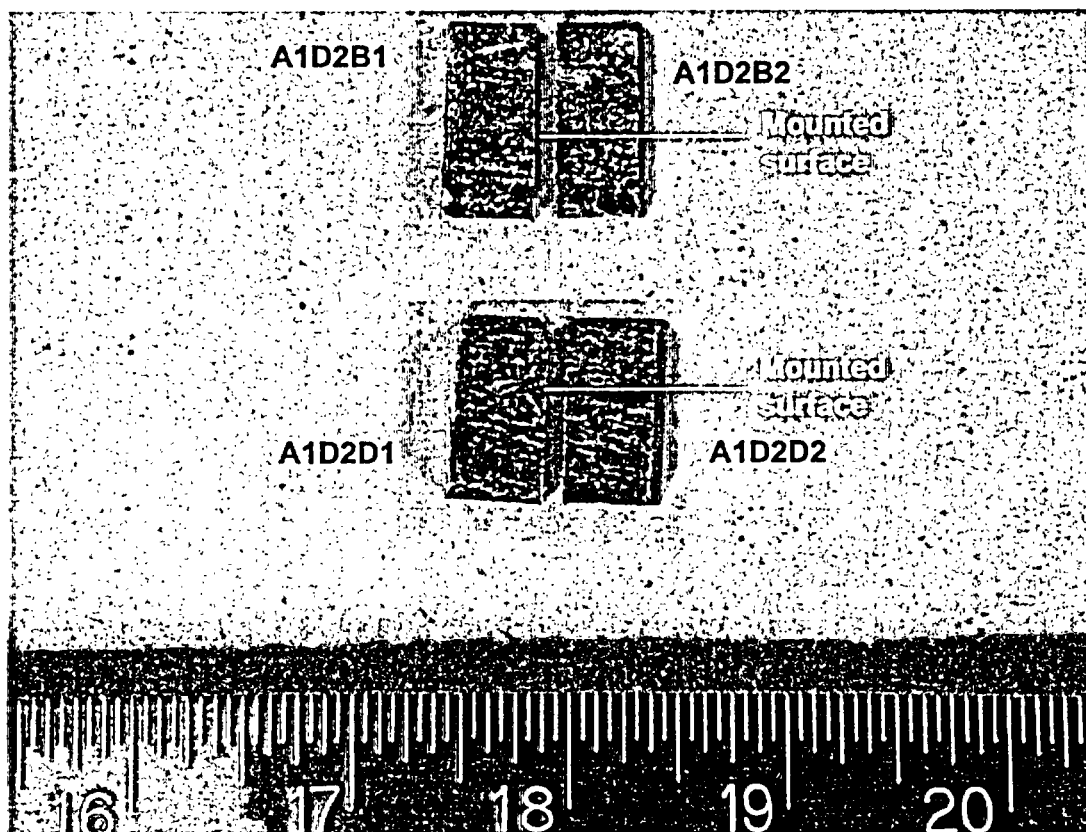


Figure 5.16: Section photo for Pieces A1D2B and A1D2D, looking at the cavity side wall. The mounted faces for Piece A1D2B1 and Piece A1D2D1 are indicated.

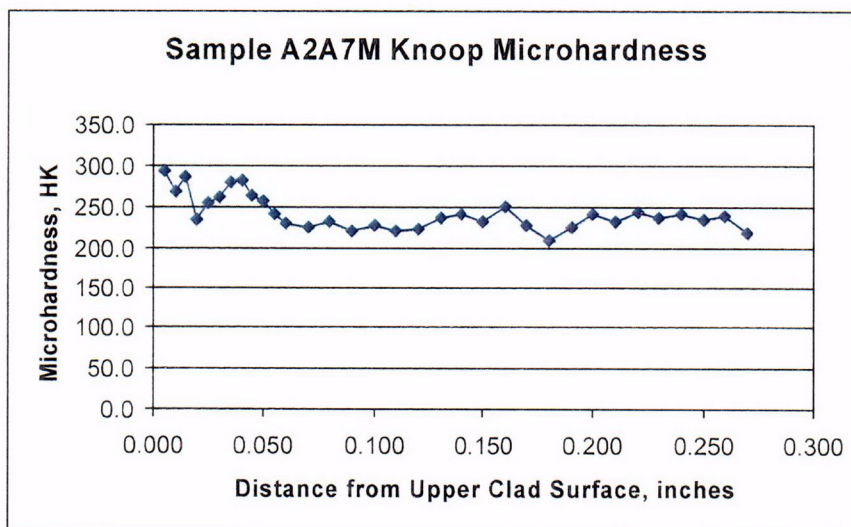
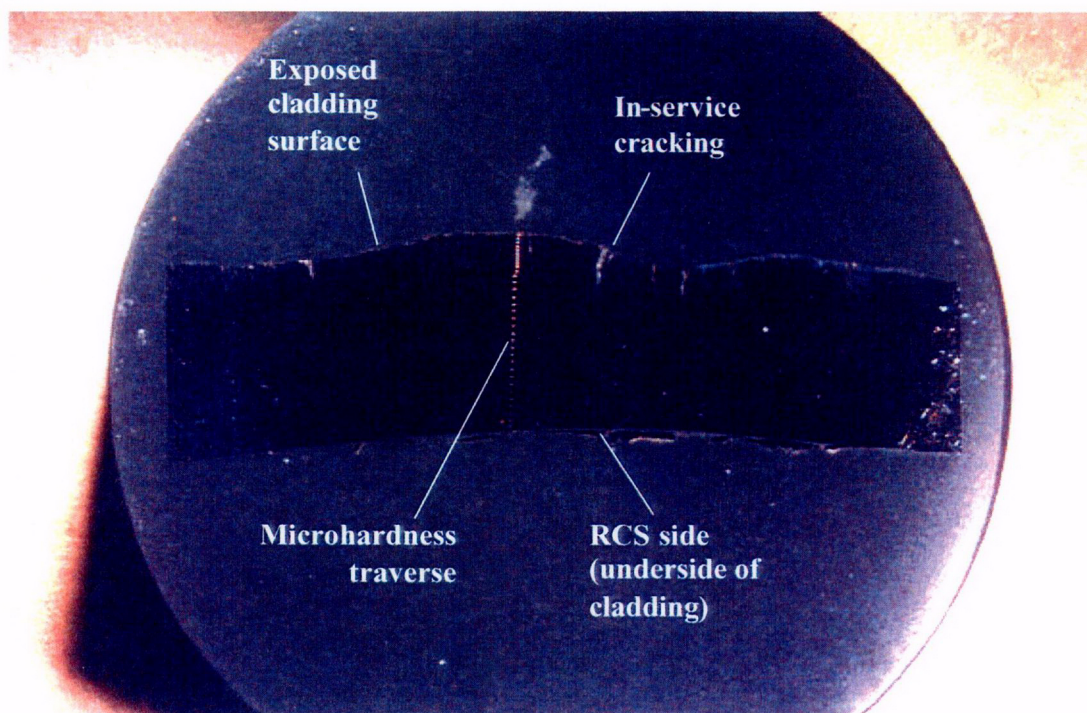


Figure 6.1.1.1: 4X macro photograph of metallurgical mount A2A7M. Refer to Figure 5.11 for the sample orientation. Cladding thickness ranged from 0.227" to 0.277" (5.77 to 7.04 mm). Knoop microhardness values exhibited a hardness elevation near the exposed cladding surface.